5. Applicable Laws, Regulations, and Other Requirements

5.1 Consultation

Certain Federal laws, such as the Endangered Species Act, the Fish and Wildlife Coordination Act, and the National Historic Preservation Act, require consultation and coordination by the United States Department of Energy (DOE) with other governmental entities. These consultation and coordination requirements will commence and be completed as site-specific spent nuclear fuel management projects and decisions are proposed. Any site-specific required consultations will be addressed in the site-specific Environmental Impact Statement (EIS) and/or in Volume I of DOE Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Draft EIS (Table 5-1).

5.2 Laws and Other Requirements

This section identifies and summarizes the major laws, regulations, Executive Orders, and DOE Orders that may apply to the receipt and management of spent nuclear fuel from foreign research reactors.

Section 5.2.1 discusses the major Federal statutes that impose environmental protection and compliance requirements upon DOE. In addition, there may be other State and local measures applicable to the foreign research reactor spent nuclear fuel because Federal law delegates enforcement or implementation authority to State or local agencies. These state- and local-specific requirements are addressed in the site-specific appendices. Section 5.2.2 addresses environmentally-related Executive Orders that clarify issues of national policy and set guidelines under which Federal agencies, including DOE, must act. DOE implements its responsibilities for protection of public health, safety, and the environment through a series of Departmental Orders that are mandatory for operating contractors of DOE-owned facilities. Section 5.2.3 discusses those DOE orders related to environmental, health, and safety protection. Hazardous and radioactive materials transportation regulations are summarized in Section 5.4.2.

5.2.1 Federal Environmental Statutes and Regulations

National Environmental Policy Act (NEPA) of 1969, as amended (42 USC §4321 et seq.)

NEPA establishes a national policy promoting awareness of the environmental consequences of the activity of humans on the environment and also promoting consideration of the environmental impacts during the planning and decision making stages of a project. This Act requires all Federal agencies to prepare a detailed statement on the environmental effects of proposed major Federal actions that may significantly affect the quality of the human environment.

This EIS has been prepared in response to these NEPA requirements and policies. It discusses reasonable alternatives and their potential environmental consequences, and has been prepared in accordance with the Council on Environmental Quality and DOE regulations for implementing the procedural provisions of the NEPA Implementing Procedures (40 CFR Parts 1500 through 1508) and DOE NEPA Implementing Procedures (10 CFR Part 1021).

Table 5-1 Agency Consultations

Subject Area	*Legislation*	*Agency*
Endangered Species	Endangered Species Act of 1973, as amended; State laws	U.S. Fish and Wildlife Service, State agencies
Migratory birds	Migratory Bird Treaty Act	U.S. Fish and Wildlife Service
Bald and Golden eagles	Bald and Golden Eagle Protection Act	U.S. Fish and Wildlife Service
Archaeological, historical, and cultural preservation	National Historic Preservation Act of 1966, Archaeological Resources Protection Act, Antiquities Act, American Indian Religious Freedom Act of 1978, Native American Grave Protection and Repatriation Act of 1990	State Historic Preservation Office, President's Advisory Council, Tribes
Discharge of pollutants to water	Clean Water Act, Safe Drinking Water Act	U.S. Environmental Protection Agency, State agencies
Work in navigable U.S. waters	Clean Water Act, Rivers and Harbors Act, Coastal Management Act	U.S. Army Corps of Engineers
Prime and unique farmlands	Farmland Protection Policy Act of 1981	Soil Conservation Service
Floodplains	Executive Order 11988, Fish and Wildlife Coordination Act	U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, State agencies
Wetlands	Executive Order 11990, Fish and Wildlife Coordination Act, Clean Water Act	U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, State agencies
Environmental justice	Executive Order 12898	U.S. Environmental Protection Agency
Water body alteration	Fish and Wildlife Coordination Act	U.S. Fish and Wildlife Service, State agencies
River status	Wild and Scenic Rivers Act, Anadromous Fish Conservation Act, Hanford Reach Study Act	U.S. Department of the Interior
Air pollution	Clean Air Act	U.S. Environmental Protection Agency, State and local agencies
Water use and availability	Water Resources Planning Act of 1965, Safe Drinking Water Act, and others	U.S. Environmental Protection Agency, Office of Water Policy, State agencies
Noise	Noise Pollution and Abatement Act of 1970, Noise Control Act of 1972	U.S. Environmental Protection Agency, State agencies
Siting and planning	State siting acts, county zoning regulations	State and County agencies
Waste management and transportation	Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act and the Hazardous and Solid Waste Amendments of 1984; Comprehensive Environmental Response, Compensation, and Liability Act; Emergency Planning and Community Right to Know Act; Hazardous Materials Transportation Act	U.S. Environmental Protection Agency, U.S. Department of Transportation, U.S. Coast Guard, State agencies
Emergency Management & Response	Defense Production Act of 1950, Robert T. Stafford Disaster Relief and Emergency, Assistance Act, National Security Act of 1947	Federal Emergency Management Agency, U.S. Environmental Protection Agency, U.S. Department of Transportation, U.S. Coast Guard, State and local agencies

Atomic Energy Act of 1954, as amended (42 USC §2011 et seq.)

The Atomic Energy Act of 1954 authorizes DOE to establish standards to protect health or minimize dangers to life or property with respect to activities under its jurisdiction. Through a series of DOE Orders, DOE has established an extensive system of standards and requirements to ensure safe operation of its facilities.

Clean Air Act, as amended (42 USC §7401 et seq.)

The Clean Air Act, as amended, is intended to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." Section 118 of the Clean Air Act, as amended, requires that each Federal agency, such as DOE, with jurisdiction over any property or facility that might result in the discharge of air pollutants, comply with "all Federal, State, interstate, and local requirements" with regard to the control and abatement of air pollution.

The Act requires the Environmental Protection Agency to establish National Ambient Air Quality Standards as necessary to protect public health, with an adequate margin of safety, from any known or anticipated adverse effects of a regulated pollutant (42 USC §7409). The Act also requires establishment of national standards of performance for new or modified stationary sources of atmospheric pollutants (42 USC §7411) and requires specific emission increases to be evaluated so as to prevent a significant deterioration in air quality (42 USC §7470). Hazardous air pollutants, including radionuclides, are regulated separately (42 USC §7412). Air emissions are regulated by the Environmental Protection Agency in 40 CFR Parts 50 through 99. In particular, radionuclide emissions are regulated under the National Emission Standard for Hazardous Air Pollutants Program (see 40 CFR Part 61).

Safe Drinking Water Act, as amended [42 USC §300 (F) et seq.]

The primary objective of the Safe Drinking Water Act, as amended, is to protect the quality of the public water supplies and all sources of drinking water. The implementing regulations, administered by the Environmental Protection Agency unless delegated to the States, establish standards applicable to public water systems. They promulgate maximum contaminant levels (including those for radioactivity), in public water systems, which are defined as water systems that serve at least 15 service connections used by year-round residents or regularly serve at least 25 year-round residents. Safe Drinking Water Act requirements have been promulgated by the Environmental Protection Agency in 40 CFR Parts 100 through 149. For radioactive material, the regulations specify that the average annual concentration of manmade radionuclides in drinking water as delivered to the user by such a system shall not produce a dose equivalent to the total body or an internal organ greater than four mrem per year beta activity. Other programs established by the Safe Drinking Water Act include the Sole Source Aquifer Program, the Wellhead Protection Program, and the Underground Injection Control Program.

Clean Water Act, as amended (33 USC §1251 et seq.)

The Clean Water Act, which amended the Federal Water Pollution Control Act, was enacted to "restore and maintain the chemical, physical and biological integrity of the Nation's water." The Clean Water Act prohibits the "discharge of toxic pollutants in toxic amounts" to navigable waters of the United States. Section 313 of the Clean Water Act, as amended, requires all branches of the Federal Government engaged in any activity that might result in a discharge or runoff of pollutants to surface waters to comply with Federal, State, interstate, and local requirements.

In addition to setting water quality standards for the Nation's waterways, the Clean Water Act supplies guidelines and limitations for effluent discharges from point-source discharges and provides authority for the Environmental Protection Agency to implement the National Pollutant Discharge Elimination System permitting program. The National Pollutant Discharge Elimination System program is administered by the Water Management Division of the Environmental Protection Agency pursuant to regulations in 40 CFR Part 122 et seq. Idaho has not applied for National Pollutant Discharge Elimination System authority from

the Environmental Protection Agency. Thus, all National Pollutant Discharge Elimination System permits required for the Idaho National Engineering Laboratory are obtained by DOE through Environmental Protection Agency Region 10 (40 CFR Part 122 et seq.).

Sections 401 and 405 of the Water Quality Act of 1987 added Section 402(p) to the Clean Water Act. Section 402(p) requires that the Environmental Protection Agency establish regulations for issuing permits for stormwater discharges associated with industrial activity. Although any stormwater discharge associated with industrial activity requires a National Pollutant Discharge Elimination System permit application, regulations implementing a separate stormwater permit application process have not yet been adopted by the Environmental Protection Agency.

Resource Conservation and Recovery Act, as amended (Solid Waste Disposal Act) (42 USC §6901 et seq.)

The treatment, storage, or disposal of hazardous and nonhazardous waste is regulated under the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act and the Hazardous and Solid Waste Amendments of 1984. Pursuant to Section 3006 of the Act, any State that seeks to administer and enforce a hazardous waste program pursuant to the Resource Conservation and Recovery Act may apply for Environmental Protection Agency authorization of its program. The Environmental Protection Agency regulations implementing the Resource Conservation and Recovery Act are found in 40 CFR Parts 260 through 280. These regulations define hazardous wastes and specify hazardous waste transportation, handling, treatment, storage, and disposal requirements.

The regulations imposed on a generator or a treatment, storage, and/or disposal facility vary according to the type and quantity of material or waste generated, treated, stored, and/or disposed of. The method of treatment, storage, and/or disposal also impacts the extent and complexity of the requirements.

Current Status of Spent Nuclear Fuel under the Resource Conservation and Recovery Act

Historically, DOE chemically reprocessed spent nuclear fuel to recover valuable products and fissionable materials, and as such, the spent nuclear fuel was not a solid waste under the Resource Conservation and Recovery Act.

World events have resulted in significant changes in DOE's direction and operations. In particular, in April 1992, DOE announced the phase-out of reprocessing for the recovery of special nuclear materials. With these changes, DOE's focus on most of its spent nuclear fuel has changed from reprocessing and recovery of materials to storage and ultimate disposition. This in turn has created uncertainty regarding the regulatory status of some of DOE's spent nuclear fuel relative to the Resource Conservation and Recovery Act.

DOE has initiated discussion with the Environmental Protection Agency on the potential applicability of the Resource Conservation and Recovery Act to spent nuclear fuel. Further discussions with Environmental Protection Agency Headquarters and regional offices and State regulators are ongoing to develop a strategy for meeting any the Resource Conservation and Recovery Act requirements that might apply.

Federal Facility Compliance Act (42 USC §6921 et seq.)

The Federal Facility Compliance Act, enacted on October 6, 1992, waives sovereign immunity for fines and penalties for Resource Conservation Recovery Act violations at Federal facilities. However, a provision postpones fines and penalties after 3 years for mixed waste storage prohibition violations at

DOE sites and requires DOE to prepare plans for developing the required treatment capacity for mixed waste stored or generated at each facility. Each plan must be approved by the host State or the Environmental Protection Agency, after consultation with other affected States, and a consent order must be issued by the regulator requiring compliance with the plan. The Federal Facility Compliance Act further provides that DOE will not be subject to fines and penalties for land disposal restriction storage prohibition violations for mixed waste as long as it is in compliance with such an approved plan and consent order and meets all other applicable regulations. This would only apply to foreign research reactor spent nuclear fuel if the Resource Conservation and Recovery Act would apply to storage and treatment of foreign research reactor spent nuclear fuel.

National Historic Preservation Act, as amended (16 USC §470 et seq.)

The National Historic Preservation Act, as amended, provides that sites with significant national historic value be placed on the *National Register of Historic Places*. There are no permits or certifications required under the Act. However, if a particular Federal activity may impact a historic property resource, consultation with the Advisory Council on Historic Preservation will usually generate a Memorandum of Agreement, including stipulations that must be followed to minimize adverse impacts. Coordination with the State Historic Preservation officer is also undertaken to ensure that potentially significant sites are properly identified and appropriate mitigative actions are implemented.

Archaeological Resource Protection Act, as amended (16 USC §470aa et seq.)

This Act requires a permit for any excavation or removal of archaeological resources from public or Native American lands. Excavations must be undertaken for the purpose of furthering archaeological knowledge in the public interest, and resources removed are to remain the property of the United States. Consent must be obtained from the Indian Tribe owning lands on which a resource is located before a permit is issued, and the permit must contain terms or conditions requested by the Tribe.

Native American Grave Protection and Repatriation Act of 1990 (25 USC §3001)

This law directs the Secretary of Interior to assume responsibilities for repatriation of Federal archaeological collections and collections held by museums receiving Federal funding that are culturally affiliated with Native American Tribes. Major actions to be taken under this law include (a) establishing a review committee with monitoring and policy-making responsibilities, (b) developing regulations for repatriation, including procedures for identifying lineal descent or cultural affiliation needed for claims, (c) oversight of museum programs designed to meet the inventory requirements and deadlines of this law, and (d) developing procedures to handle unexpected discoveries of graves or grave goods during activities on Federal or tribal land.

American Indian Religious Freedom Act of 1978 (42 USC §1996)

This Act reaffirms Native American religious freedom under the First Amendment, and sets U.S. policy to protect and preserve the inherent and constitutional right of Native Americans to believe, express, and exercise their traditional religions. The Act requires that Federal actions avoid interfering with access to sacred locations and traditional resources that are integral to the practice of religions.

Religious Freedom Restoration Act of 1993 (42 USC §2000bb et seq.)

This Act prohibits the Government, including Federal Departments, from substantially burdening the exercise of religion unless the Government demonstrates a compelling governmental interest, and the action furthers a compelling Government interest and is the least restrictive means of furthering that interest.

Endangered Species Act, as amended (16 USC §1531 et seq.)

The Endangered Species Act, as amended, is intended to prevent the further decline of endangered and threatened species and to restore these species and their habitats. The Act is jointly administered by the United States Departments of Commerce and the Interior. Section 7 of the Act requires consultation with the U.S. Fish and Wildlife Service to determine whether endangered and threatened species or their critical habitats are known to be in the vicinity of the proposed action. The Idaho National Engineering Laboratory has commenced the consultation process with the U.S. Fish and Wildlife Service (DOE, 1995c). The Savannah River Site, the Hanford Site, the Oak Ridge Reservation, and the Nevada Test Site have also commenced consultations with the U.S. Fish and Wildlife Service.

Migratory Bird Treaty Act, as amended (16 USC §703 et seq.)

The Migratory Bird Treaty Act, as amended, is intended to protect birds that have common migration patterns between the United States and Canada, Mexico, Japan, and Russia. It regulates the harvest of migratory birds by specifying things such as the mode of harvest, hunting seasons, and bag limits. The Act stipulates that it is unlawful at any time, by any means, or in any manner to "kill . . . any migratory bird." Although no permit for this project is required under the Act, DOE is required to consult with the U.S. Fish and Wildlife Service regarding impacts to migratory birds and to evaluate ways to avoid or minimize these effects in accordance with the U.S. Fish and Wildlife Service Mitigation Policy.

Bald and Golden Eagle Protection Act, as amended (16 USC §668-668d)

The Bald and Golden Eagle Protection Act makes it unlawful to take, pursue, molest, or disturb bald (American) and golden eagles, their nests, or their eggs anywhere in the United States (Sections 668, 668c). A permit must be obtained from the U.S. Department of the Interior to relocate a nest that interferes with resource development or recovery operations.

Wild and Scenic Rivers Act, as amended (16 USC 1271 et seq. 71:8301 et seq.)

The Wild and Scenic Rivers Act, as amended, protects certain selected rivers of the Nation that possess outstanding scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar values. These rivers are to be preserved in a free-flowing condition to protect water quality and other vital national conservation purposes. The purpose of the Act is to institute a national wild and scenic rivers system, to designate the initial rivers that are a part of that system, and to develop standards for the addition of new rivers in the future.

Occupational Safety and Health Act of 1970, as amended (29 USC §651 et seq.)

The Occupational Safety and Health Act establishes standards to enhance safe and healthful working conditions in places of employment throughout the United States. The Act is administered and enforced by the Occupational Safety and Health Administration, a U.S. Department of Labor agency. While the Occupational Safety and Health Administration and Environmental Protection Agency both have a mandate to reduce exposures to toxic substances, the Occupational Safety and Health Administration's

jurisdiction is limited to safety and health conditions that exist in the workplace environment. In general, under the Act, it is the duty of each employer to furnish all employees a place of employment free of recognized hazards likely to cause death or serious physical harm. Employees have a duty to comply with the occupational safety and health standards and all rules, regulations, and orders issued under the Act. the Occupational Safety and Health Administration regulations (29 CFR) establish specific standards telling employers what must be done to achieve a safe and healthful working environment. DOE places emphasis on compliance with these regulations at its facilities and prescribes through DOE Orders the Occupational Safety and Health Act standards that contractors shall meet, as applicable to their work at Government-owned, contractor-operated facilities (DOE Order 5480.1B, 5483.1A). DOE keeps and makes available the various records of minor illnesses, injuries, and work-related deaths as required by the Occupational Safety and Health Administration regulations.

Noise Control Act of 1972, as amended (42 USC §4901 et seq.)

Section 4 of the Noise Control Act of 1972, as amended, directs all Federal agencies to carry out "to the fullest extent within their authority" programs within their jurisdictions in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health and welfare.

5.2.2 Executive Orders

Executive Order 11514 (Protection and Enhancement of Environmental Quality)

Executive Order 11514 requires Federal agencies to continually monitor and control their activities to protect and enhance the quality of the environment and to develop procedures to ensure the fullest practicable provision of timely public information and understanding of the Federal plans and programs with environmental impact to obtain the views of interested parties. The DOE has issued regulations (10 CFR 1021) and DOE Order 5440.1E for compliance with this Executive Order.

Executive Order 11988 (Floodplain Management)

Executive Order 11988 requires Federal agencies to establish procedures to ensure that the potential effects of flood hazards and floodplain management are considered for any action undertaken in a floodplain and that floodplain impacts be avoided to the extent practicable.

Executive Order 11990 (Protection of Wetlands)

Executive Order 11990 requires Governmental agencies to avoid any short- and long-term adverse impacts on wetlands wherever there is a practicable alternative.

Executive Order 12856 (Right-to-Know Laws and Pollution Prevention Requirements)

Executive Order 12856 requires all Federal agencies to reduce the toxic chemicals entering any waste stream. This order also requires Federal agencies to report toxic chemicals entering waste streams; improve emergency planning, response, and accident notification; and encourage clean technologies and testing of innovative prevention technologies.

Executive Order 12898 (Environmental Justice)

Executive Order 12898 requires Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

Table 5-2 DOE Orders Relevant to the DOE Spent Nuclear Fuel Management Program

DOE Order	*Subject*
1300.2A	Department of Energy Technical Standards Program (5-19-92)
1360.2B	Unclassified Computer Security Program (5-18-92)
1540.2	Hazardous Material Packaging for Transport-Administrative Procedures (9-30-86; Chg. 1. 12-19-88)
3790.1B	Federal Employee Occupational Safety and Health Program (1-7-93)
4330.4A	Maintenance Management Program (10-17-90)
4700.1	Project Management System (3-6-87)
5000.3B	Occurrence Reporting and Utilization of Operations Information (4-9-92)
5400.1	General Environmental Protection Program (11-9-88; Chg. 1, 6-29-90)
5400.2A	Environmental Compliance Issue Coordination (Errata 1-31-89)
5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Requirements (10-6-89)
5400.5	Radiation Protection of the Public and the Environment (2-8-90; Chg. 2, 1-7-93)
5440.1E	National Environmental Policy Act Compliance Program (11-10-92)
5480.1B	Environmental, Safety and Health Program for DOE Operations (9-23-86; Chg. 4, 3-27-90)
5480.3	Environmental Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes (7-9-85)
5480.4	Environmental Protection, Safety, and Health Protection Standards (5-15-84; Chg. 4, 1-7-93)
5480.6	Safety of Department of Energy-Owned Nuclear Reactors (9-23-86)
5480.7A	Fire Protection (2-17-93)
5480.8A	Contractor Occupational Medical Program (6-26-92)
5480.9	Construction Safety and Health Program (11-18-87)
5480.10	Contractor Industrial Hygiene Program (6-26-85)
5480.11	Radiation Protection for Occupational Workers (12-21-88; Chg. 2, 6-29-90)
5480.15	Department of Energy Laboratory Accreditation Program for Personnel Dosimetry (12-14-87)
5480.17	Site Safety Representatives (10-05-88))
5480.18A	Accreditation of Performance-Based Training for Category A Reactors and Nuclear Facilities (07-19-91)
5480.19	Conduct of Operations Requirements for DOE Facilities (7-9-90; Chg. 1, 5-18-92)
5480.20	Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Nonreactor Nuclear Facilities (2-20-91)
5480.21	Unreviewed Safety Questions (12-24-91)
5480.22	Technical Safety Requirements (2-25-92; Chg. 1, 9-15-92)
5480.23	Nuclear Safety Analysis Reports (4-10-92)
5480.24	Nuclear Criticality Safety (8-12-92)
5480.27	Equipment Qualification for Reactor and Nonreactor Nuclear Facilities (1-15-93)
5480.28	Natural Phenomena Hazards Mitigation (1-15-93)
5480.31	Startup and Restart of Nuclear Facilities (9-15-93)
5481.1B	Safety Analysis and Review System (9-23-86; Chg. 1, 5-19-87)
5482.1B	Environment, Safety, and Health Appraisal Program (9-23-86; Chg. 1, 11-18-91)
5483.1A	Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned, Contractor-Operated Facilities (6-22-83)
5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements (2-21-81; Chg. 7, 10-17-90)
5500.1B	Emergency Management System (4-30-91; Chg. 1, 4-30-91)
5500.2B	Emergency Categories, Classes, and Notification and Reporting Requirements (4-30-91; Chg. 1, 2-27-92)
5500.3A	Planning and Preparedness for Operational Emergencies (4-30-91; Chg. 1, 2-27-92)
5500.4A	Public Affairs Policy and Planning Requirements for Emergencies (6-8-92)
5500.7B	Emergency Operating Records Protection Program (10-23-91)
5500.10	Emergency Readiness Assurance Program (4-30-91; Chg. 1, 2-27-92)
5530.3	Radiological Assistance Program (01-14-92; Change 1, 4-10-92)
5530.5	Federal Radiological Monitoring and Assessment Center (7-10-92)
5630.11A	Safeguards and Security Program (12-7-92)
5630.12A	Safeguards and Security Inspection and Evaluation Program (6-23-92)
5700.6C	Quality Assurance (8-21-91)
5820.2A	Radioactive Waste Management (9-26-88)
6430.1A	General Design Criteria (4-6-89)

5.2.3 DOE Regulations and Orders

Through the authority of the Atomic Energy Act, DOE is responsible for establishing a comprehensive health, safety, and environmental program for its facilities. The regulatory mechanisms through which DOE manages its facilities are the promulgation of regulations and the issuance of DOE Orders.

The DOE regulations are generally found in 10 CFR. These regulations address such areas as energy conservation, administrative requirements and procedures, nuclear safety, and classified information. For the purposes of this EIS, relevant regulations include 10 CFR Part 834, Radiation Protection of the Public and the Environment; 10 CFR Part 835, Occupational Radiation Protection; 10 CFR Part 1021, Compliance with NEPA; and 10 CFR Part 1022, Compliance with Floodplains/Wetlands Environmental Review Requirements. DOE has enacted occupational radiation protection standards to protect DOE and its contractor employees. These standards are set forth in 10 CFR Part 83b, Occupational Radiation Protection. The rules in this part establish radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities, including those conducted by DOE contractors. The activity may be, but is not limited to, design, construction, or operation of DOE facilities. These regulations would be in effect for the construction and operation of any facilities associated with the management of foreign research reactor spent nuclear fuel.

DOE Orders generally set forth policy and the programs and internal procedures for implementing those policies. The major DOE Orders pertaining to the eventual construction and operation of spent nuclear fuel facilities within the DOE Complex are listed in Table 5-2.

5.2.4 Nuclear Regulatory Commission (NRC) Licensing Standards

DOE is proceeding with actions to implement safe, efficient, and cost-effective interim storage of its spent nuclear fuel before final disposition. The need for interim storage has led DOE to evaluate storage technologies and alternative management strategies to provide an optimum solution to storage challenges. Several commercial storage technologies under evaluation for DOE-owned spent nuclear fuel have been licensed and regulated by NRC. In addition, DOE-owned spent nuclear fuel could eventually come under the jurisdiction of NRC if it is to be disposed of in a geological repository. Therefore, DOE is considering having any new interim storage facilities reviewed to determine whether they could meet NRC licensing standards. This approach, if implemented, would provide a testing ground for the development of the technical and administrative protocols between NRC and DOE in the event that some type of NRC regulatory oversight occurs in the future.

5.3 International Regulations

Regulations of the International Atomic Energy Agency

The International Atomic Energy Agency is an agency of the United Nations headquartered in Vienna, Austria. The International Atomic Energy Agency establishes standards for radioactive materials transportation. These are published as model regulations (Safety Series No. 6) that may be adopted by individual nations. These model regulations are regularly revised and updated. Safety Series 6 was revised in 1990 (IAEA, 1990). To the extent considered feasible, the U.S. Nuclear Regulatory Commission (NRC) and the Department of Transportation both periodically review and revise their regulations to bring them into general accord with the International Atomic Energy Agency regulations.

The emphasis of the International Atomic Energy Agency model regulations is on package integrity. To that end, packagings must be shown to survive a hypothetical accident sequence that includes impact, crush, puncture, fire, and immersion. The level of protection is defined by the nature of the contents. The intent of the regulations is to maximize the shipper's contribution to safety, and the shipper (consignor) must certify "that the contents of this consignment are properly described by name; are properly packaged, marked and labeled; and are in proper condition for transport ... " (IAEA, 1990a). The carrier is responsible for following rules for stowage and for segregation from persons.

International Maritime Organization Regulations

The International Maritime Organization publishes the International Maritime Dangerous Goods Code (IMO, 1994), which was developed to supplement the provisions of the 1960 International Convention on the Safety of Life at Sea, as amended, (IMO, 1992) to which the United States is a signatory. Included are regulations that deal with carriage of radioactive material (Class 7 materials). They are based on the International Atomic Energy Agency regulations and deal with segregation of radioactive materials packages from other dangerous goods and other aspects of stowage.

5.4 Domestic Regulations for Radioactive Material Packaging and Transportation

Hazardous and Radioactive Materials Transportation Regulations

Transportation of hazardous and radioactive materials, substances, and wastes are governed by the Department of Transportation, NRC, and the Environmental Protection Agency regulations. These regulations may be found in 49 CFR Parts 171 through 178, 49 CFR Parts 383 through 397, 10 CFR Part 71, and 40 CFR Parts 262 and 265, respectively.

Department of Transportation regulations contain requirements for identifying a material as hazardous or radioactive. These regulations interface with NRC or the Environmental Protection Agency regulations for identifying material, but the Department of Transportation hazardous material regulations govern the hazard communication (such as marking, hazard labeling, vehicle placarding, and emergency response telephone number) and shipping requirements (such as required entries on shipping papers or the Environmental Protection Agency waste manifests).

NRC regulations applicable to radioactive materials transportation are found in 10 CFR Part 71, which includes detailed packaging design requirements and package certification testing requirements. Complete documentation of design and safety analysis and results of the required testing are submitted to the NRC to certify the package for use. This certification testing involves the following components: heat, physical drop onto an unyielding surface, water submersion, puncture by dropping package onto a steel bar, and gas tightness. The recent revision of 10 CFR Part 71, issued on September 28, 1995 (60 CFR 50248), is intended primarily to bring this regulation into conformance with current International Atomic Energy Agency regulations. Revised regulations applicable to the transportation of spent nuclear fuel from foreign research reactors are essentially unchanged.

The Environmental Protection Agency regulations pertaining to hazardous waste transportation are found in 40 CFR Parts 262 and 265. These regulations address labeling and record keeping requirements, including the use of the Environmental Protection Agency waste manifest, which is the required shipping paper for transporting the Resource Conservation and Recovery Act hazardous waste.

5.4.1 NRC Packaging Certification

An NRC certificate is issued as evidence that a packaging and its contents meet applicable Federal regulations. The certificate is issued on the basis of a Safety Analysis Report on the packaging design. Type B packaging must survive certain severe hypothetical accident conditions of impact, puncture, fire, and immersion. The tests are not intended to duplicate accident environments, but rather to produce damage equivalent to extreme accidents. The complete accident sequence is described in 10 CFR, Part 71.73.

Test Sequence for Type B Packagings

The effects of the tests on a package may be evaluated either by subjecting a scale model sample package to the test or by other methods acceptable to the NRC. NRC Regulatory Guide 7.9 allows assessment of package performance by analysis, prototype testing, model testing, or comparison to a similar package. To be judged as surviving, the packaging must not exceed allowable releases defined in 10 CFR 71.51. The dose rate outside the packaging must not exceed 1 rem per hour at a distance of 1 m (3.3 ft) from the packaging surface. The first three tests must be performed on the same package in this order: drop test, puncture test, and thermal test (with an immersion test following for fissile material packagings only).

The drop test consists of a 9-m (30-ft) drop onto a flat, essentially unyielding, horizontal surface, striking the package surface in the position for which maximum damage is expected. An essentially unyielding surface is one that absorbs very little of the energy of impact, which means that the energy of impact is absorbed almost entirely by the package. Unyielding surfaces are constructed of a monolithic concrete base, reinforced by Rebar and covered with a plate of battleship armor. The puncture test consists of a 1-m (40-in) drop onto the upper end of a 15-cm (6-in) solid, vertical, cylindrical bar of mild steel mounted on an essentially unyielding surface. The top of the bar must be horizontal and its edge rounded to a radius of not more than 6 mm (0.25 in).

In the thermal test, the packaging must be exposed for not less than 30 minutes to a heat flux not less than that of a radiation environment of 800°C (1,475°F) with an emissivity coefficient of a least 0.9. The surface absorptivity must be either the value that the package may be expected to possess if exposed to a fire or 0.8, whichever is greater. When it might be significant, convective heat input must be included on the basis of still, ambient air. The packaging may not be artificially cooled after external heat input ceases, and any combustion of materials of construction must be allowed to proceed until it terminates naturally.

Fissile materials packagings for which water in leakage has not been assumed for criticality analysis must be subjected to submersion under a head of water of at least 0.9 m (3 ft) for not less than 8 hours and in the attitude for which the maximum leakage is expected. All packages must be subjected to a separate test in which an undamaged cask is submerged under a head of water of at least 15 m (50 ft) for not less than 8 hours.

Although spent fuel casks have been involved in several accidents, their integrity has never been compromised. The regulatory tests are structured to place an upper bound on the kinds of damage seen in actual severe transportation accidents. Furthermore, after completion of this series of performance qualification tests, Type B packagings are further subjected to a post-accident leak-rate performance test (10 CFR 71.51). In this test, no escape of radioactive material is allowed that exceeds an A2 amount in a week. The A2 amount of an isotope is the maximum activity of that isotope in a potentially dispersible form that is allowed to be shipped in a Type A packaging, which is nonaccident resistant. Safety Series No. 6 lists A2 values for all commonly transported isotopes.

The NRC revised 10 CFR Part 7 regulations governing the transportation of radioactive materials on September 28, 1995 (60 FR 50248). These regulations become effective on April 1, 1996 (NRC, 1995). The revised regulations conform with those of the International Atomic Energy Agency and current legislative requirements. The revised regulations affecting "Type B" casks require that a spent nuclear fuel transportation cask with activity greater than 106 curies be designed and constructed so that its undamaged containment system would withstand an external water pressure of 290 psi, or immersion in 200 meters (656 ft) of water, for a period of not less than one hour without collapse, buckling, or allowing water to leak into the cask.

The use of an essentially unyielding target makes the regulatory certification tests extremely demanding. Real targets are much more yielding. For example, a lead-shield steel cask was dropped 610 m (2,000 ft) from a helicopter onto undisturbed soil (NRC, 1977). Impact velocity was 396 km per hour (235 mph). The cask penetrated 2.4 m (8 ft) into the hard soil but suffered no measurable deformation. An identical cask dropped 9 m (30 ft) onto an essentially unyielding surface during regulatory testing suffered considerably more deformation (Jefferson and Yoshimura, 1978). More recent research has expanded the study of yielding targets (e.g., concrete surfaces) and their comparison with the regulatory surface (Gonzalez et al., 1986).

5.4.2 Transportation Regulations

To assure that the transportation cask is properly prepared for transportation, trained technicians perform numerous inspections and tests (10 CFR §71.87). These tests are designed to ensure that the cask components are properly assembled and meet leak-tightness, thermal, radiation, and contamination limits. The tests and inspections are clearly identified in the Safety Analysis Report for Packaging and/or the Certificate of Compliance for each cask. Casks can only be operated by registered users who conduct operations in accordance with documented and approved quality assurance programs meeting the requirements of the regulatory authorities. Records must be maintained that document proper cask operations in accordance with the quality requirements of 10 CFR §71.91. Reports of defects or accidental mishandling must be submitted to NRC.

Communications

Proper communication assists in assuring safe preparation and handling of transportation casks. Communication is provided by labels, markings, placarding, and shipping papers or other documents. Labels (49 CFR §172.403) applied to the cask document the contents and the amount of radiation emanating from the cask exterior (transport index). The transport index lists the ionizing radiation level (in mrem/hr) at a distance of 1 m (3.3 ft) from the cask surface.

In addition to the label requirements, markings (49 CFR Subpart D and §173.471) should be placed on the exterior of the cask to show the proper shipping name and the consignor and consignee in case the cask is separated from its original shipping documents (40 CFR §172.203). Transportation casks are required to be permanently marked with the designation "Type B," the owner's (or fabricator's) name and address, the Certificate of Compliance number, and the gross weight (10 CFR §71.83).

Placards (49 CFR §172.500) are applied to the transport vehicle or freight container holding the transportation cask. The placards indicate the radioactive nature of the contents. In the United States, spent nuclear fuel is a Highway Route Controlled Quantity which must be placarded according to 49 CFR §172.507. Placards provide the first responders to a traffic or transportation accident with initial information about the nature of the contents.

Shipping papers should have entries identifying the following: the name of the shipper, emergency response telephone number, description of spent nuclear fuel, and the shipper's certificate as described in 49 CFR §172 Subpart C.

In addition, drivers of motor vehicles transporting spent nuclear fuel must have training in accordance with the requirements of 49 CFR §172.700. The training requirements include: familiarization with the regulations, emergency response information, and the spent nuclear fuel communication programs required by the Occupational Safety and Health Administration. Drivers are also required to have training on the procedures necessary for safe operation of the vehicle used to transport the spent nuclear fuel.

Except for exclusive-use shipments, requirements relating to transport indexes state that:

> ". . . the number of freight containers with packages of radioactive materials contained therein must be limited so that the total sum of the transport indexes in the containers in any hold or defined deck area does not exceed 200, and:
>
> (1) The sum of transport indexes for any individual freight container, or group of freight containers, does not exceed 50; and,
>
> (2) Each freight container or group of freight containers is (are) handled and stowed in such a manner that groups are separated from each other by a distance of at least six m (20 ft)," [49 CFR §176.704(c)].

Section 176.76(a) includes provision for freight containers with hazardous materials to be carried onboard a vessel in accordance with the following:

> " (1) The material must be in proper condition for transportation according to the requirements of this subchapter;
>
> (2) All packages in the transport vehicle or container must be secured to prevent movement in any direction. However, vertical restraint is not required if the shape of the packages and the stuffing pattern precludes shifting of the load;
>
> (3) Bulkheads made of dunnage which extend to the level of the cargo must be provided unless the packages are stowed flush with the sides or ends;
>
> (4) Dunnage must be secured to the floor when the cargo consists of dense materials or heavy packages."

Each freight container must be placarded as required by 49 CFR §172 Subpart F of the Hazardous Materials Regulations [49 CFR 176.76(f)].

Section 49 CFR 176.80 requires that radioactive materials be segregated from other hazardous materials so that they do not interact dangerously in an accident, or alternatively, requires that the radioactive material be in separate holds when stored under deck. In 49 CFR 176.83(b), a table is provided (Table II) that specifies the minimum separation distances for different classes of hazardous materials onboard a vessel. A minimum horizontal separation distance of 3 m (10 ft) projected vertically from the reference package is required. For specified hazardous materials, the "separate from" requirement means that the materials must be placed in separate holds when stowed under deck.

Marine Transport

Relevant regulations applying to transport of spent nuclear fuel by vessel are found in 10 CFR Parts 71 and 73, and 49 CFR Part 176. The USCG, part of the Department of Transportation, inspects vessels for compliance with applicable regulations and requires 24-hour prenotification (33 CFR 160.207, 211, and 213).

Section 49 CFR 171.12 (d) states that: "Radioactive materials being imported into or exported from the United States, or passing through the United States in the course of being shipped between places outside the U.S., may be offered and accepted for transportation when packaged, marked, labeled, and otherwise prepared for shipment in accordance with the IAEA 'Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1985 Edition' including 'Supplement 1988.'" Certain specified conditions of this section must be complied with. For example, highway-route-controlled quantities of radioactive material must be shipped in accordance with appropriate provisions of the hazardous materials regulations and a Certificate of Competent Authority must be obtained, with any necessary revalidations. A Certificate of Competent Authority fulfills the International Atomic Energy Agency requirement for multilateral approval for a shipment of Type B packages in international commerce (IAEA, 1990a).

Section 49 CFR 176.5 details the application of the regulations to vessels: "...this subchapter applies to each domestic or foreign vessel when in the navigable waters of the United States, regardless of its character, tonnage, size or service, and whether self-propelled or not, whether arriving or departing, underway, moored, anchored, aground, or while in drydock." Exempted from the regulations are vessels not engaged in commercial service, a vessel used exclusively for pleasure, a vessel of 500 gross tons or smaller, engaged in fisheries, etc. Section 49 CFR 176.15 provides for enforcement of 40 CFR Subchapter C:

> "(a) An enforcement officer of the U.S. Coast Guard may at any time and at any place, within the jurisdiction of the United States, board any vessel for the purpose of enforcement of this subchapter and inspect any shipment of hazardous materials as defined in this subchapter."

Provision is also made in this section to detain a vessel that is in violation of the hazardous materials regulations.

The USCG may accept a certificate of loading issued by the National Cargo Bureau, Inc., as evidence that the cargo is stowed in conformity with law and regulatory requirements. The National Cargo Bureau, Inc., is a non-profit organization directed by government and industry representatives (49 CFR 176.18 authorizes inspectors of the National Cargo Bureau, Inc., to assist the USCG in administering the hazardous materials regulations). Their functions are as follows:

> "(1) Inspection of vessels for suitability for loading hazardous materials; (2) Examination of stowage of hazardous materials; (3) Making recommendations for stowage requirements of hazardous materials cargo; and, (4) Issuance of certificates of loading setting forth that the stowage of hazardous materials is in accordance with the requirements of 46 U.S.C. 170 and its subchapter."

Detailed requirements for shipping radioactive material are located in Part 176 Subpart M of the hazardous materials regulations. General radioactive materials stowage requirements of 49 CFR 176.700 state that: "(b) A package of radioactive materials which in still air has a surface temperature more than 5°C (9°F) above the ambient air may not be overstowed with any other cargo. If the package is stowed under the deck, the hold or compartment in which it is stowed must be ventilated."

Except for exclusive-use shipments, requirements of 176.704 (c) relating to transport indexes state that:

> "the number of freight containers with packages of radioactive materials contained therein must be limited so that the total sum of the transport indexes in the containers in any hold or defined deck area does not exceed 200, and: (1) The sum of transport indexes for any individual freight container, or group of freight containers, does not exceed 50; and, (2) Each freight container or group of freight containers is handled and stowed in such a manner that groups are separated from each other by a distance of at least six meters (20 feet)."

Section 176.76(a) includes provision for freight containers with hazardous materials to be carried on board a vessel in accordance with the following:

> "(1) The material must be in proper condition for transportation according to the requirements of this subchapter; (2) All packages in the transport vehicle or container must be secured to prevent movement in any direction. Vertical restraint is not required if the shape of the packages, loading pattern, and horizontal restraint preclude vertical movement of the load within the freight container or transport vehicle; (3) Bulkheads made of dunnage which extend to the level of the cargo must be provided unless the packages are stowed flush with the sides or ends; (4) Dunnage must be secured to the floor when the cargo consists of dense materials or heavy packages."

Each freight container must be placarded as required by Subpart F of Part 172 of the hazardous materials transportation regulations [49 CFR 176.76(f)].

Section 49 CFR 176.80 requires that radioactive materials be segregated from other hazardous materials so that they do not interact dangerously in an accident or, alternatively, requires that the radioactive material be in separate holds when stored under deck. In 49 CFR 176.83(b), a table is provided (Table II) that specifies the minimum separation distances for different classes of hazardous materials on board a vessel. A minimum horizontal separation distance of 3 m (10 ft) projected vertically from the reference package is required. For specified hazardous materials, the "separate from" requirement means that the materials must be placed in separate holds when stowed under deck.

Ground Transport

Overland shipments (by rail car or by truck) are regulated by a variety of the Department of Transportation and NRC regulations dealing with packaging, notification, escorts and communication. In addition, there are specific regulations for carriage by truck and carriage by rail.

When provisions are made to secure a package so that its position within the transport vehicle remains fixed during transport, with no loading or unloading between the beginning and end of transport, a package shipped overland in exclusive-use closed transport vehicles may not exceed the following radiation levels as provided in 49 CFR 173.441(b):

1. 200 millirem per hour on the external surface of the package unless the following conditions are met, in which case the limit is 1,000 millirem per hour;

    i. The shipment is made in a closed transport vehicle;

    ii. The package is secured within the vehicle so that its position remains fixed during transportation; and

    iii. There are no loading or unloading operations between the beginning and end of the transportation;

2. 200 millirem per hour at any point on the outer surface of the vehicle, including the top and underside of the vehicle; or in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load (or enclosure is used), and on the lower external surface of the vehicle;

3. 10 millirem per hour at any point 2 m (6.6 ft) from the outer lateral surfaces of the vehicle (excluding the top and underside of the vehicle); or in the case of a flat-bed style vehicle, at any point 2 m (6.6 ft) from the vertical planes projected by the outer edges of the vehicle (excluding the top and underside of the vehicle); and

4. 2 millirem per hour in any normally occupied space.

The shipper of record must comply with the requirements of 10 CFR 71.5 and 73.37. Section 71.5 provides that all overland shipments must be in compliance with Department of Transportation and NRC regulations, which provide for security of irradiated reactor fuel. General requirements include:

- Provide notification to NRC in advance of each shipment,
- Develop a shipping plan,
- Provide escort instructions
- Establish a communication center to be staffed 24 hours a day,
- Make arrangements with local law enforcement agencies along the route for their response, if not using law enforcement personnel as escort, ensure that the escorts are trained in accordance with 10 CFR 73.37 Appendix D, and
- Ensure that escorts make notification calls every 2 hours to the communications center.

Additional requirements include having two armed escorts within heavily populated areas (when not in heavily populated areas, only one escort is needed) and the capability of communicating with the communications center and local law enforcement agencies through a radiotelephone or other NRC-approved means of two-way voice communications.

The shipper of record, as required by 49 CFR 173.22, provides physical security measures for spent fuel shipments equivalent to those of the NRC. The shipper and his agent will provide notification for unclassified spent fuel shipments to State officials.

For carriage by truck, the carrier will use interstate highways or State-designated preferred routes for movement of radioactive materials in conformity with the Department of Transportation rule known as Docket HM-164. These regulations, found in 49 CFR 397.101, establish routing and driver training requirements for highway carriers of packages containing "highway-route-controlled quantities" of radioactive materials. Spent fuel shipments constitute such quantities. Department of Transportation rules make those routes designated by appropriate State agencies enforceable by the Federal Government according to the Department of Transportation's own determination that such route designations, when accompanied by an adequate safety analysis, are likely to result in further reduction of radiological risk.

For carriage by rail car, each shipment by the railroad must comply with 49 CFR 174, in particular, 174 Subpart K, Detailed Requirements for Radioactive Materials.

5.5 Emergency Management and Response

5.5.1 Authorities and Directives

Emergency Planning and Community Right-to-Know Act of 1986 (42 USC §11001 et seq.) (also known as "SARA Title III")

Under Subtitle A of this Act, Federal facilities, including those owned by DOE, provide various information (such as inventories of specific chemicals used or stored and releases that occur from these sites) to the State Emergency Response Commission and to the Local Emergency Planning Committee to ensure that emergency plans are sufficient to respond to unplanned releases of hazardous substances. Implementation of the provisions of this Act began voluntarily in 1987, and inventory and annual emissions reporting began in 1988 based on 1987 activities and information. DOE also requires compliance with Title III as a matter of Agency policy. The requirements for this Act were promulgated by the Environmental Protection Agency in 40 CFR Parts 350 through 372.

The Toxic Substances Control Act also regulates the treatment, storage, and disposal of certain toxic substances not regulated by the Resource Conservation and Recovery Act or other statutes, particularly polychlorinated biphenyls, chlorofluorocarbons, and asbestos.

Quantities of Radioactive Materials Requiring Consideration of the Need for an Emergency Plan for Responding to a Release (10 CFR Part 30.72 Schedule C)

This list is the basis for both the public and private sector to determine if the radiological materials they deal with must have an emergency response plan for unscheduled releases. It is one of the threshold criteria documents for DOE Hazards Assessments required by DOE Order 5500.3A, "Planning and Preparedness for Operational Emergencies" (DOE, 1991c).

Occupational Safety and Health Administration Emergency Response, Hazardous Waste Operations and Worker Right to Know (29 CFR)

This regulation sets down the Occupational Safety and Health Administration requirements for employee safety in a variety of working environments. It addresses employee emergency and fire prevention plans (Section 1910.38), hazardous waste operations and emergency response (Section 1910.120), and hazards communication (Section 1910.1200) that enables employees to be aware of the dangers they face from hazardous materials at their workplace.

Emergency Management and Assistance (44 CFR 1.1)

This regulation contains the policies and procedures for the Federal Emergency Management Act, National Flood Insurance Program, Federal Crime Insurance Program, Fire Prevention and Control Program, Disaster Assistance Program, and Preparedness Program including radiological planning and preparedness.

Hazardous Materials Tables & Communications, Emergency Response Information Requirements (49 CFR Part 172)

The regulatory requirements for marking, labeling, placarding, and documenting hazardous materials shipments are defined in this regulation. It also specifies the requirements for providing hazardous material information and training.

Public Law 93-288, as Amended by Public Law 100-707, "Robert T. Stafford Disaster Relief and Emergency Assistance Act," November 23, 1988

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended, provides an orderly and continuing means of assistance by the Federal Government to State and local governments in carrying out their responsibilities to alleviate the suffering and damage resulting from disasters. The President, in response to a State Governor's request, may declare an "emergency" or "major disaster," in order to provide Federal assistance under the Act. The President, in Executive Order 12148, delegated all functions, except those in Sections 301, 401, and 409, to the Director, Federal Emergency Management Agency. The Act provides for the appointment of a Federal Coordinating Officer who will operate in the designated area with a State Coordinating Officer for the purpose of coordinating State and local disaster assistance efforts with those of the Federal Government.

Public Law 96-510, "Comprehensive Environmental Response, Compensation, and Liability Act of 1980," Section 104(i), 42 U.S.C. 9604(i)

More popularly known as "Superfund," this Act provides the needed general authority for Federal and State governments to respond directly to hazardous substances incidents. The Act requires reporting of spills, including radioactive, to the National Response Center.

Public Law 98-473, Justice Assistance Act of 1984

These Department of Justice regulations implement the Emergency Federal Law Enforcement Assistance functions vested in the Attorney General. Those functions were established to assist State and/or local units of government in responding to a law enforcement emergency. The Act defines the term "law enforcement emergency" as an uncommon situation which requires law enforcement, which is or threatens to become of serious or epidemic proportions, and with respect to which State and local resources are inadequate to protect the lives and property of citizens, or to enforce the criminal law. Emergencies that are not of an ongoing or chronic nature, such as the Mount Saint Helens volcanic eruption, are eligible for Federal law enforcement assistance. Such assistance is defined as funds, equipment, training, intelligence information, and personnel. Requests for assistance must be submitted in writing to the Attorney General by the chief executive office of a State. The Plan does not cover the provision of law enforcement assistance. Such assistance will be provided in accordance with the regulations referred to in this paragraph [28 CFR Part 65, implementing the Justice Assistance Act of 1984] or pursuant to any other applicable authority of the Department of Justice.

Communications Act of 1934, as Amended

This Act gives the Federal Communications Commission emergency authority to grant Special Temporary Authority on an expedited basis to operate radio frequency devices.

5.5.2 Executive Orders

Executive Order 10480, as Amended, "Further Providing for the Administration of the Defense Mobilization Program," August 1953

Part II of the Order delegates to the Director, Federal Emergency Management Agency, with authority to redelegate, the priorities and allocation functions conferred on the President by Title I of the Defense Production Act of 1950, as amended.

Executive Order 12148, "Federal Emergency Management," July 20, 1979

Executive Order 12148 transferred functions and responsibilities associated with Federal emergency management to the Director, Federal Emergency Management Agency. The Order assigns the Director, Federal Emergency Management Agency, the responsibility to establish Federal policies for and to coordinate all civil defense and civil emergency planning, management, mitigation, and assistance functions of Executive Agencies.

Executive Order 12472, "Assignment of National Security and Emergency Preparedness Telecommunications Functions," April 3, 1984

Executive Order 12472 establishes the National Communication System. The National Communication System consists of the telecommunications assets of the entities represented on the National Communication System Committee of Principals and an administrative structure consisting of the Executive Agent, the National Communication System Committee of Principals, and the Manager. The National Communication System Committee of Principals consists of representatives from those Federal departments, agencies, or entities, designated by the President, which lease or own telecommunications facilities or services of significance to national security or emergency preparedness.

Executive Order 12656, "Assignment of Emergency Preparedness Responsibilities," November, 1988

This order assigns emergency preparedness responsibilities to Federal departments and agencies.

5.5.3 Emergency Planning Documents

"Federal Radiological Emergency Response Plan," November 1985

This document is to be used by Federal agencies in peacetime radiological emergencies. It primarily concerns the off-site Federal response in support of State and local governments with jurisdiction for the emergency. The Federal Radiological Emergency Response Plan provides the Federal Government's concept of operations based on specific authorities for responding to radiological emergencies, outlines Federal policies and planning assumptions that underlie this concept of operations and on which Federal agency response plans were based, and specifies authorities and responsibilities of each Federal agency that may have a significant role in such emergencies.

"National Plan for Telecommunications Support [in Non-Wartime Emergencies," January 1992

This plan provides guidance in planning for and providing telecommunications support for Federal agencies involved in emergencies, major disasters, and other urgent events, excluding war.

Department of Defense Directive 3025.1, "Military Support to Civil Authorities," 1992

This directive outlines Department of Defense policy on assistance to the civilian sector during disasters and other emergencies. Use of the Department of Defense military resources in civil emergency relief operations will be limited to those resources not immediately required for the execution of the primary defense mission. Normally, the Department of Defense military resources will be committed as a supplement to non-Department of Defense resources that are required to cope with the humanitarian and property protection requirement caused by the emergency. In any emergency, commanders are authorized to employ Department of Defense resources to save lives, prevent human suffering, or mitigate great property loss. Upon declaration of a major disaster under the provisions of P.L. 93-288, as amended, the Secretary of the Army is the Department of Defense Executive Agent, and the Director of Military Support

is the action agent for civil emergency relief operations. Military personnel will be under command of and directly responsible to their military superiors and will not be used to enforce or execute civil law in violation of 18 U.S.C. 1385, except as otherwise authorized by law. Military resources shall not be procured, stockpiled, or developed solely to provide assistance to civil authorities during emergencies.

Federal Preparedness Circular 8, "Public Affairs in Emergencies"

This Circular establishes the Interagency Committee on Public Affairs in Emergencies to coordinate public information planning and operations for management of emergency information. The Circular was reviewed in draft by the Interagency Committee on Public Affairs in Emergencies and will receive formal department and agency review.

American Red Cross Disaster Services Regulations and Procedures, ARC 3003, January 1984

This document details the delegation of disaster services program responsibilities to officials and units of the American Red Cross. Also defined are the American Red Cross administrative regulations and procedures for disaster planning, preparedness, and response.

Statement of Understanding between the Federal Emergency Management Agency and the American National Red Cross, January 22, 1982

The statement of understanding between the Federal Emergency Management Act and the American National Red Cross describes major responsibilities in disaster preparedness planning and operations in the event of a war-caused national emergency or a peacetime disaster, outlines areas of mutual support and cooperation, and provides a frame of reference for similar cooperative agreements between State and local governments and the operations headquarters and chapters of the American Red Cross.

6. List of Preparers

Name:	Charles R. Head
Affiliation:	Department of Energy
Education:	MS, Control Theory, George Washington University BS, Electrical Engineering, Rice University
Experience/ Technical Specialty:	Twenty-seven years. Nuclear safety oversight, safeguards and security requirements, Tiger Team assessments, spent fuel storage.
EIS Responsibility:	DOE Foreign Research Reactor Spent Nuclear Fuel Project Manager
Name:	Patrick J. Wells
Affiliation:	Department of Energy
Education:	MS, Engineering Management, George Washington University BS, Civil Engineering, Marquette University
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EIS Responsibility:	Assistant to the DOE Project Manager
Name:	Darren W. Piccirillo
Affiliation:	Department of Energy
Education:	BS, Physics, Southern Connecticut State University
Experience/ Technical Specialty:	Eight years. Reactor plant construction and operation.
EIS Responsibility:	Spent fuel characterization, storage impact analysis
Name:	Eleanor R. Busick
Affiliation:	Department of State
Education:	MA, Economics, Yale University BA, Oberlin College
Experience/ Technical Specialty:	Nineteen years. Nuclear nonproliferation policy, economics (fuel markets, finance).
EIS Responsibility:	Nonproliferation and national policies

Name:	Fred McGoldrick
Affiliation:	Department of State
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Name:	Ibrahim H. Zeitoun
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Education:	PhD, Environmental Sciences, Michigan State University MS, Fisheries, Michigan State University BS, Chemistry & Zoology, University of Alexandria
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EIS Responsibility:	Overall EIS Project Manager. NEPA compliance, spent fuel management environmental justice
Name:	Audrey J. Adamson
Affiliation:	Science Applications International Corporation
Education:	BA, University of Michigan MPA, George Washington University
Experience/ Technical Specialty:	Eleven years. International, environmental, and technology policy analysis, public outreach, and technical writing.
EIS Responsibility:	Emergency response and communication planning
Name:	Douglas H. Amick
Affiliation:	Science Applications International Corporation
Education:	AS, Law Enforcement, Walter State Community College
Experience/ Technical Specialty:	Twenty years. Marine ports, port safety inspections and security, plant operations, transportation risks.
EIS Responsibility:	Port safety, operation and characteristics

Name:	Paula W. Austin
Affiliation:	Science Applications International Corporation
Education:	BS, Management and Technology, University of Maryland
Experience/ Technical Specialty:	Nineteen years. Nuclear and environmental policy analysis, public outreach, technical writing.
EIS Responsibility:	EIS Summary, public hearings task leader
Name:	Rakesh Bahadur
Affiliation:	Science Applications International Corporation
Education:	PhD, Groundwater Hydrology, Colorado State University MS, Groundwater Hydrology, Colorado State University MSc, Geology, Punjab University
Experience/ Technical Specialty:	Fifteen years. Hydrology, site characterization, environmental assessment, and risk assessment.
EIS Responsibility:	Affected environment, Geographic Information Systems, Environmental Justice
Name:	Bruce M. Biwer
Affiliation:	Argonne National Laboratory
Education:	PhD, Chemistry, Princeton University MA, Chemistry, Princeton University BA, Chemistry, St. Anselm College
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EIS Responsibility:	Radiological transportation risk analysis
Name:	Keith R. Brown
Affiliation:	Science Applications International Corporation
Education:	MS, Mathematics, Idaho Sate University BS, Mathematics, Idaho State University
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EIS Responsibility:	Spent fuel management, transportation assessment

Name:	Burrus M. Carnahan
Affiliation:	Science Applications International Corporation
Education:	LLM, International Law, University of Michigan JD, Northwestern University BA, Political Science, Drake University
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EIS Responsibility:	Nonproliferation policies
Name:	Harry Chernoff
Affiliation:	Science Applications International Corporation
Education:	MBA, Marymount University BA, Economics, College of William & Mary
Experience/ Technical Specialty:	Seventeen years. Economics, socioeconomics, finance, and engineering economics.
EIS Responsibility:	Costs, and Socioeconomics
Name:	Louis Cofone, Jr.
Affiliation:	Science Application International Corporation
Education:	MS, Microbiology, University of Dayton BS, Biology, Philadelphia College of Pharmacy and Science
Experience/ Technical Specialty:	Twenty years. Computer information analysis, data base development and management, environmental and health risk assessment.
EIS Responsibility:	Development and management of the comment tracking and document control system
Name:	Cecil C. Cross, III
Affiliation:	Science Applications International Corporation
Education:	MEM, Environmental Management, Duke University BA, Biology, Gettysburg College
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EIS Responsibility:	Port operation, port environmental and climatic conditions

Name:	Larry Danese
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EIS Responsibility:	Transportation casks and regulations, port operation regulations and activities
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EIS Responsibility:	Ground transportation safety and impact analysis, port selection and operation
Name:	Scott E. Drummond, Jr.
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EIS Responsibility:	Port information
Name:	Habib A. Durrani
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Experience/ Technical Specialty:	Twenty years. Nuclear facilities operation, design maintenance regulations and safety
EIS Responsibility:	Chemical separation technologies
Name:	Barbara M. Ebert
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Experience/ Technical Specialty:	Twelve years. Weapons proliferation.
EIS Responsibility:	Nonproliferation policies

Name:	Martin W. Ebert
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Education:	BSc, Nuclear Engineering, University of Arizona MSc, Applied Physics, University of Strathclyde
Experience/ Technical Specialty:	Twenty-four years. Nuclear powerplant operations, spent fuel technology, and technical safety requirements.
EIS Responsibility:	Marine and port safety and impact analysis, public hearings response coordinator
Name:	Daniel W. Gallagher
Affiliation:	Science Applications International Corporation
Education:	MS, Nuclear Engineering, Rensselaer Polytechnic Institute BS, Nuclear Engineering, Rensselaer Polytechnic Institute
Experience/ Technical Specialty:	Fifteen years. Reliability and risk engineering, probabilistic safety assessment, plant design, and regulatory analysis.
EIS Responsibility:	Marine and port safety and impact analysis
Name:	Reginald L. Gotchy
Affiliation:	Science Applications International Corporation
Education:	PhD, Radiation Biology, Colorado State University MS, Radiation Health, Colorado State University BS, Zoology, University of Washington
Experience/ Technical Specialty:	Twenty-six years. NEPA compliance, safety analysis, risk assessment, radiation biology, health physics (Certified Health Physicist), and emergency response planning.
EIS Responsibility:	Port selection and radiological consequences and health effects
Name:	Peter Grier
Affiliation:	Science Applications International Corporation
Education:	BS, Psychology, University of Maryland
Experience/ Technical Specialty:	Twenty years. Emergency management, commercial nuclear energy, quality assurance, and transportation regulatory compliance.
EIS Responsibility:	Emergency response, security, and communication planning

Name:	Timothy T. Holmes
Affiliation:	Science Applications International Corporation
Education:	JD, University of Kansas School of Law BA, Business, Washburn University
Experience/ Technical Specialty:	Four years. Legal and environmental analysis, involving NEPA, RCRA, and other environmental regulations, document review and contract compliance.
EIS Responsibility:	Comment Response Document task leader, technical editor
Name:	Joseph W. James
Affiliation:	Science Applications International Corporation
Education:	BSG, Administration of Justice, American University MA, Management, Central Michigan University PhD, Environmental Science, LaSalle University
Experience/ Technical Specialty:	Thirty years. Nuclear safeguards and security, standards development, quality assurance, regulatory analysis, and licensing support.
EIS Responsibility:	Safeguards and security planning
Name:	Roy Karimi
Affiliation:	Science Applications International Corporation
Education:	ScD, Nuclear Engineering, Massachusetts Institute of Technology NE, Nuclear Engineering, Massachusetts Institute of Technology MS, Nuclear Engineering, Massachusetts Institute of Technology BSc, Chemical Engineering, Abadan Institute of Technology
Experience/ Technical Specialty:	Fourteen years. Nuclear powerplant safety, risk and reliability analysis, design analysis, and probabilistic risk assessment.
EIS Responsibility:	Spent fuel characterization, accident and impact analysis, quality control reviews
Name:	Stephen J. Krill, Jr.
Affiliation:	Science Applications International Corporation
Education:	BS, Nuclear and Power Engineering, University of Cincinnati
Experience/ Technical Specialty:	Five years. Safety and risk analysis, reactor and fuel processing system design, operation and inspection, and emergency preparedness.
EIS Responsibility:	Transportation cask descriptions, environmental consequences

Name:	Merritt E. Langston, PE
Affiliation:	Science Applications International Corporation
Education:	BS, MS, Metallurgical Engineering, Missouri School of Mines
Experience/ Technical Specialty:	Thirty-two years. Quality management, nuclear engineering, defense programs, nuclear waste management. Six years. Reactor containment materials development.
EIS Responsibility:	Technical reviews, quality control task leader
Name:	Christi D. Leigh
Affiliation:	Sandia National Laboratories
Education:	PhD, Engineering, University of New Mexico MS, Chemical Engineering, Stanford University BS, Chemical Engineering, Arizona State University
Experience/ Technical Specialty:	Six years. Radioactive and hazardous waste management and minimization. Five years. Nuclear reactor safety.
EIS Responsibility:	At-sea submerged cask risk assessment
Name:	Charles D. Massey
Affiliation:	Sandia National Laboratories
Education:	PhD, Radiation Health, University of Pittsburgh MS, Health Physics, University of Pittsburgh BS, Marine Transportation, U.S. Merchant Marine Academy
Experience/ Technical Specialty:	Thirteen years. NEPA, risk assessment, transportation and energy technology evaluation.
EIS Responsibility:	Marine transportation risk assessment and impacts
Name:	Ronya J. McMillen
Affiliation:	Science Applications International Corporation
Education:	MA, International Science & Technology Policy, George Washington University BS, Sociology, Chatham College
Experience/ Technical Specialty:	Thirteen years. Technical analysis and report writing. Four years public outreach and policy analysis on domestic and foreign nuclear technology regulatory issues.
EIS Responsibility:	EIS Summary Coordinator, Public comment and hearing summaries

Name:	Charles D. Miller
Affiliation:	Science Applications Internal Corporation
Education:	BS, Marine Transportation, SUNY Maritime College
Experience/ Technical Specialty:	Forty years. Transportation/distribution system design, planning, implementation,.and management.
EIS Responsibilty:	Port information
Name:	Todd Miller
Affiliation:	Science Applications International Corporation
Education:	BS, Civil Engineering, Worcester Polytechnic Institute
Experience/ Technical Specialty:	Four years. Safety analysis, environmental assessment, NEPA compliance.
EIS Responsibility:	Accident analysis, radiological consequences
Name:	Steven M. Mirsky
Affiliation:	Science Applications International Corporation
Education:	MS, Nuclear Engineering, Pennsylvania State University BS, Mechanical Engineering, The Cooper Union
Experience/ Technical Specialty:	Nineteen years. Safety analysis, nuclear powerplant design, operations, and foreign nuclear powerplant system analysis.
EIS Responsibility:	Storage technology, safety and impact analysis
Name:	Frederick A. Monette
Affiliation:	Argonne National Laboratory
Education:	MS, Health Physics, Colorado State University BA, Physics, St. Johns University
Experience/ Technical Specialty:	Six years. Radiological risk assessment, radiological transportation risk analysis, dose calculations.
EIS Responsibility:	Radiological transportation risk and impacts analysis
Name:	Michael Moore
Affiliation:	Science Applications International Corporation
Education:	BA, Economics, University of Maryland
Experience/ Technical Specialty:	Twelve years. Analysis and design of environmental/waste information systems, drafting and editing of technical documents for energy, environmental, and defense initiatives.
EIS Responsibility:	Quality control reviews, technical editor

Name:	Alexander P. Murray
Affiliation:	Science Applications International Corporation
Education:	MS, Chemical Engineering, Carnegie-Mellon University BS, Chemical Engineering, Carnegie-Mellon University
Experience/ Technical Specialty:	Nineteen years. Waste management, environmental and regulatory compliance, design engineering and computer modeling, nuclear reactors and systems, dose analysis, nuclear fuel cycle, and spent fuel reprocessing.
EIS Responsibility:	Storage and chemical separation technologies
Name:	Iral C. Nelson
Affiliation:	Pacific Northwest Laboratories
Education:	MA, Physics, University of Oregon Diplomate, American Board of Health Physics BS, Mathematics, University of Oregon
Experience/ Technical Specialty:	Thirty-nine years. Health physics, radiation protection, and NEPA compliance and reviews.
EIS Responsibility:	Affected environment, environmental consequences
Name:	Aris Papadopoulos
Affiliation:	Science Applications International Corporation
Education:	MS, Nuclear Engineering, University of Utah BS, Physics, Hamline University
Experience/ Technical Specialty:	Twenty-two years. Safety analysis assessment, regulatory reviews, reactor safety, fuel cycle facility systems, radioactive waste management, and accident analysis support.
EIS Responsibility:	Transportation casks, storage alternatives, and impact assessment
Name:	Kathleen Rhoads
Affiliation:	Pacific Northwest Laboratories
Education:	MS, Radiological Sciences, University of Washington BS, Microbiology, University of Washington
Experience/ Technical Specialty:	Nineteen years. Risk assessment, radiation doses, health effects from energy production.
EIS Responsibility:	Radiological consequences analysis

Name:	Van Romero
Affiliation:	Sandia National Laboratories
Education:	PhD, Physics, State University of New York MS, Physics, New Mexico Tech BS, Physics, New Mexico Tech
Experience/ Technical Specialty:	Fifteen years. Environmental health physics and radiation protection, NEPA compliance, DOE order compliance, environmental impact testing, risk assessment, nuclear safety, health physics, radiation transport, and nuclear emergency response.
EIS Responsibility:	Radiation exposure analysis for marine transport
Name:	William B. Samuels
Affiliation:	Science Applications International Corporation
Education:	PhD, Biology, Fordham University MS, Marine Science, Long Island University BS, Biology & Geology, University of Rochester
Experience/ Technical Specialty:	Sixteen years. Geographic Information Systems, computer simulation and mathematical modeling, environmental database management systems.
EIS Responsibility:	Geographic Information Systems, environmental justice
Name:	Elizabeth C. Saris
Affiliation:	Science Applications International Corporation
Education:	BA, Political Science, George Washington University
Experience/ Technical Specialty:	Fifteen years. Energy and environmental policy analysis, public outreach, and technical writing.
EIS Responsibility:	EIS Summary, public hearings support
Name:	Patrick R. Schwab
Affiliation:	Science Applications International Corporation
Education:	PhD, Nuclear Engineering, University of Wisconsin MS, Nuclear Engineering, University of Wisconsin BS, Nuclear Engineering, Kansas State University
Experience/ Technical Specialty:	Eighteen years. Design criteria, technical safety surveys, foreign nuclear technology analysis, configuration studies, and spent fuel reprocessing.
EIS Responsibility:	Environmental and policy consequences, chemical separation technologies and impacts

Name:	Barry Smith
Affiliation:	Science Applications International Corporation
Education:	JD, George Washington University National Law Center BA, Political Science, Indiana University
Experience/ Technical Specialty:	Twenty-three years. NEPA compliance, environmental law, regulatory compliance, and waste management.
EIS Responsibility:	Environmental regulation/compliance
Name:	Jeremy L. Sprung
Affiliation:	Sandia National Laboratories
Education:	PhD, Physical-Organic Chemistry, UCLA BA, Chemistry, Yale University
Experience/ Technical Specialty:	Twenty-nine years. Photochemistry and air pollution, reactor accident consequences, reactor safety studies, and transportation risk assessment.
EIS Responsibility:	Port accident risk analysis
Name:	Donna J. Stucky
Affiliation:	Pacific Northwest Laboratories
Education:	MS, Agricultural Economics, Purdue University BA, Economics, Pacific Lutheran University
Experience/ Technical Specialty:	Two years. Economic research.
EIS Responsibility:	Environmental consequences
Name:	Robert Wayland
Affiliation:	Science Applications International Corporation
Education:	PhD, Atmospheric Science, North Carolina State University MS, Environmental Science, University of Virginia BA, Environmental Science, University of Virginia
Experience/ Technical Specialty:	Eleven years. Boundary-layer meteorology, atmospheric structure and composition, ocean-atmosphere interactions, atmospheric modeling.
EIS Responsibility:	Port meteorological data assessments, site nonradiological impact analyses

Name:	Timothy Wheeler
Affiliation:	Sandia National Laboratories
Education:	MS, Systems Engineering, University of Virginia BS, Mechanical Engineering, University of New Hampshire
Experience/ Technical Specialty:	Fourteen years. NEPA compliance, radioactive material transportation risk analysis, probabilistic risk assessment.
EIS Responsibility:	At-sea submerged cask risk assessment
Name:	John W. Williams
Affiliation:	Science Applications International Corporation
Education:	PhD, Physics, New Mexico State University MS, Physics, New Mexico State University BS, Mathematics, North Texas State University
Experience/ Technical Specialty:	Twenty years. NEPA compliance, electromagnetic models, air quality modeling, ionizing radiation impacts and safety.
EIS Responsibility:	Environmental justice, ports selection, quality control reviews
Name:	Steven E. Wujciak
Affiliation:	U.S. Department of Transportation, Research & Special Projects Administration, Volpe National Transportation System Center
Education:	MBA, Anna Maria College BS, Business Administration, Anna Maria College
Experience/ Technical Specialty:	Fifteen years. Operations research, transportation analysis, emergency preparedness.
EIS Responsibility:	Ground transportation analysis
Name:	Maron D. Wylie
Affiliation:	U.S. Department of Transportation, Research & Special Projects Administration, Volpe National Transportation System Center
Education:	MS, Math and Computer Science, Worcester State College BS, Business Administration, University of Southern Mississippi
Experience/ Technical Specialty:	Fifteen years. Operations research, transportation analysis, emergency preparedness.
EIS Responsibility:	Ground transportation analysis

Name	Michael R. Zanotti
Affiliation:	Science Applications International Corporation
Education:	MPA, Administrative Management and Organization, Golden Gate University MPA, Health Services Administration, Golden Gate University BA, Behavioral Sciences, University of Maine AA, Criminal Justice, University of Maine
Experience/ Technical Specialty:	Fifteen years. Certified Emergency Manager (CEM), Emergency management, emergency response, fire response, hazardous materials response, facilities operation.
EIS Responsibility:	Emergency management and response

7. Agencies Consulted

The following agencies were consulted in the development of this Draft Environmental Impact Statement.

Federal Agencies

Arms Control and Disarmament Agency
Military Traffic Management Command
Military Ocean Terminal, Oakland (CA)
Military Ocean Terminal, Sunny Point (NC)
Naval Weapons Station, Concord (CA)
Naval Weapons Station, Charleston (SC)
Port Hueneme (CA) Naval Construction Battalion Center
U.S. Department of Defense
U.S. Department of Army
U.S. Coast Guard
U.S. Merchant Marine Academy
U.S. Fish and Wildlife Service

State Agencies

Alabama Department of Conservation and Natural Resources
Alabama Department of Environmental Management, Water Quality Division
Alabama Natural Heritage Program
Alabama State Docks, Mobile (AL)
California Fish & Game Heritage Program
California Regional Water Quality Control Board, San Francisco Bay Region
Delaware Department of Natural Resources and Environmental Control, Division of Water Resources
Delaware Natural Heritage Inventory
Florida Department of Environmental Regulation, Bureau of Surface Water Management
Florida Natural Areas Inventory
Fort Clinch State Park, Amelia Island, FL
Georgia Department of Natural Resources, Environmental Protection Division
Georgia Department of Natural Resources, Wildlife Resources Division
Georgia Ports Authority
John U. Lloyd Beach State Recreation Area, Port Everglades, FL
Louisiana Department of Environmental Quality
Louisiana Natural Heritage Program
Maryland Natural Heritage Program
Massachusetts Port Authority
Maryland Port Administration
Mississippi Department of Environmental Quality, Water Quality Division
Mississippi Natural Heritage Program
Mississippi State Port Authority at Gulfport
New Hampshire Port Authority
New Jersey Natural Heritage Program
North Carolina Department of Environment, Health, and Natural Resources, Division of Environmental Management
North Carolina Natural Heritage Program
North Carolina State Ports Authority
Oregon Natural Heritage Program
Pennsylvania Department of Environmental Resources, Water Quality Division
Pennsylvania Natural Diversity Inventory
Ports Authority of New York & New Jersey
South Carolina Department of Health and Environmental Control, Water Quality Division
South Carolina Heritage Trust
South Carolina State Ports Authority
South Jersey Port Corporation
Virginia Department of Conservation and Recreation, Division of Natural Heritage
Virginia Department of Environmental Quality, Water Division
Virginia Water Control Board
Virginia Port Authority
Washington Department of Wildlife

Local Agencies

Bridgeport Port Authority (CT)
Commissioners of Pilotage, Port of Charleston (SC)
Jacksonville Port Authority (FL)
Manatee County Port Authority (FL)
Penn Terminals (Port of Eddystone, PA)
Port Authority of Greater New Orleans (LA)
Port Everglades Authority (FL)
Port of Albany (NY)
Port of Alexandria (VA)
Port of Baton Rouge (LA)
Port of Beaumont (TX)
Port of Corpus Christi (TX)
Port of Fall River (MA)

Local Agencies (Continued)

Port of Fernandina (FL)
Port of Galveston (TX)
Port of Grays Harbor (WA)
Port of Houston Authority (TX)
Port of Hueneme (CA)
Port of Long Beach (CA)
Port of Longview (WA)
Port of Los Angeles (CA)
Port of Miami (FL)
Port of New Haven (CT)
Port of Oakland (CA)
Port of Palm Beach (FL)
Port of Port Arthur (TX)
Port of Portland (ME)
Port of Portland (OR)
Port of Portsmouth (NH)
Port of Richmond (CA)
Port of Richmond Commission (VA)
Port of San Francisco (CA)
Port of Seattle (WA)
Port of Tacoma (WA)
Port of Vancouver, U.S.A. (WA)
Port of Wilmington (DE)
Port of Wilmington (NC)
San Diego Unified Port District (CA)
Tampa Port Authority (FL)

Other

Australian Nuclear Science & Technology Organization (ANSTO)
Austrian Research Centre, Austria
Belgian Nuclear Research Centre
GKSS Research Center, Germany
Hahn-Meitner Institut Berlin, Germany
Interfaculty Reactor Institute, Delft University of Technology, The Netherlands
Joint Research Centre-Petten, Institute for Advanced Materials, The Netherlands
National Center for Scientific Research, "Demokritos," Greece
Paul Scherrer Institute, Switzerland
RISO National Laboratory, Denmark
Studsvik Nuclear AB, Sweden
United Kingdom Atomic Energy Authority, Thurso, Dounreay Caithness, Scotland

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9. Glossary

Absorbed dose. The energy imparted by ionizing radiation per unit mass of irradiated material. The unit of absorbed dose is the rad.

Accident. An unplanned sequence of events that results in undesirable consequences.

Actinide. Any of a series of chemically similar, mostly synthetic, radioactive elements with atomic numbers ranging from actinium (89) through lawrencium (103).

Acute exposure. A single exposure to a toxic substance which may result in severe biological harm or death. Acute exposures are usually characterized as lasting no longer than a day.

Alpha-emitter. A radioactive substance that decays by releasing an alpha particle.

Alpha particle. A particle consisting of two protons and two neutrons, given off by the decay of many elements, including uranium, plutonium, and radon. Alpha particles cannot penetrate a sheet of paper. However, alpha emitting isotopes in the body can be very damaging.

As low as reasonably achievable (ALARA). The approach to radiation protection to manage and control exposures (both individual and collective) to the work force and to the general public to as low as is reasonable, taking into account social, technical, economic, practical, and public policy considerations. ALARA is not a dose limit but a process which has the objective of attaining doses as far below the applicable limits as is reasonably achievable.

Atomic Energy Act (AEA). A law passed in 1954 that placed nuclear production and control of nuclear materials within a civilian agency, originally the Atomic Energy Commission. The Atomic Energy Commission was replaced by the U.S. Nuclear Regulatory Commission, the U.S. Department of Energy, and predecessor agencies (i.e., ERDA, FERC).

Atomic number. The number of positively charged protons in the nucleus of an atom or the number of electrons on an electrically neutral atom.

Background radiation. Radiation from: (1) Naturally occurring radioactive materials which have not been technologically enhanced, (2) cosmic sources, (3) global fallout as it exists in the environment (such as from the testing of nuclear explosive devices), (4) radon and its progeny in concentrations or levels existing in buildings or the environment which have not been elevated as a result of current or prior activities, and (5) consumer products containing nominal amounts of radioactive material or producing nominal amounts of radiation.

Beta particle. A particle emitted in the radioactive decay of many radionuclides. A beta particle is identical with an electron. It has a short range in air and a low ability to penetrate other materials.

Canning. The process of placing spent nuclear fuel in canisters to retard corrosion, contain radioactive releases, or control geometry.

Cask. A heavily shielded massive container for holding nuclear materials during shipment.

Characterization. The determination of waste or spent nuclear fuel composition and properties, whether by review of process knowledge, nondestructive examination or assay, or sampling and analysis, generally done to determine appropriate storage, treatment, handling, transportation, and disposal requirements.

Chemical separation. A process for extracting uranium and plutonium from dissolved spent nuclear fuel and irradiated targets. The fission products that are left behind are high level wastes. Chemical separation is also known as reprocessing.

Cladding. The outer layer of metal over the fissile material of a nuclear fuel element. Cladding on the Department of Energy's spent fuel is usually aluminum, zirconium, or stainless steel.

Collective dose. The sum of the total effective dose equivalents of all individuals in a specified population. Collective dose is expressed in units of person-rem (or person-sievert).

Committed effective dose equivalent. The sum of the committed dose equivalents to various tissues in the body, each multiplied by the appropriate weighting factor. Committed effective dose equivalent is expressed in units of rem (or sievert), and will be accumulated during the fifty years following an intake of radioactive material into an individual's body.

Competitive fee. A fee that could be charged to foreign research reactor operators related to the estimated cost of spent nuclear fuel management and disposal outside the United States.

Conditioning. See stabilization (of spent nuclear fuel).

Contact-handled waste. Packaged waste whose external surface dose rate does not exceed 200 mrem per hour.

Contamination. The deposition of undesirable radioactive material on the surfaces of structures, areas, objects, or personnel.

Core. The central portion of a nuclear reactor containing the fuel elements, moderator, neutron poisons, and support structures.

Criticality. The conditions in which a system is capable of sustaining a nuclear chain reaction.

Cumulative impact. The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Curie. The basic unit used to describe the intensity of radioactivity in a sample of material. The curie is equal to 37 billion disintegrations per second, which is approximately the rate of decay of 1 gram of the isotope radium-266. A curie is also a quantity of any radionuclide that decays at a rate of 37 billion disintegrations per second.

Decay (radioactive). Spontaneous disintegration of the nucleus of an unstable atom, resulting in the emission of particles and energy.

Decommissioning. Retirement of a nuclear facility, including decontamination and/or dismantlement.

Decontamination. Removal of unwanted radioactive or hazardous contamination by a chemical or mechanical process.

Degraded (spent nuclear fuel). See failed fuel.

Depleted uranium. Uranium that, through the process of enrichment, has been stripped of most of the uranium-235 it once contained, so that it has more uranium-238 than natural uranium. It is used as shielding, in some parts of nuclear weapons, and as a raw material for plutonium production.

Developed countries. Countries with high-income economies (World Bank, 1994).

Developing countries. Countries with other-than-high-income economies (World Bank, 1994).

Discounted dollars. Expressing income and expenditures that occur over time as if they occurred at a common point in time.

Disposal of fuel. Emplacement of fuel to ensure its isolation from the biosphere, with no intention of retrieval.

DOE Orders. Requirements internal to the U.S. Department of Energy (DOE) that establish DOE policy and procedures, including those for compliance with applicable laws.

Dose (or radiation dose). A generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed effective dose equivalent, or total effective dose equivalent as defined elsewhere in this glossary.

Dose rate. The radiation dose delivered per unit time (e.g., rem per year).

Dry storage. Storage of spent nuclear fuel in environments where the fuel is not immersed in water for purposes of both cooling and shielding.

Ecology. The relationship of living things to one another and their environment, or the study of such relationships.

Effective dose equivalent. The summation of the products of the dose equivalent received by specified tissues of the body and the appropriate weighting factor. It includes the dose from radiation sources internal and/or external to the body. The effective dose equivalent is expressed in units of rem (or sievert).

Endangered species. Animals, birds, fish, plants, or other living organisms threatened with extinction by man-made or natural changes in their environment. Requirements for declaring a species endangered are contained in the Endangered Species Act.

Enriched uranium. Uranium that has greater amounts of the isotope uranium-235 than occurs naturally. Naturally occurring uranium is 0.72 percent uranium-235.

Environmental monitoring. The process of sampling and analysis of environmental media in and around a facility being monitored for the purpose of (1) confirming compliance with performance objectives and (2) early detection of any contamination entering the environment to facilitate timely remedial action.

Escalation. A real change in the price level of a particular good or service, unrelated to inflation.

Existing facilities. Facilities that existed at an active DOE site as of the Record of Decision for this Environmental Impact Statement.

Failed fuel. Spent nuclear fuel whose external cladding has cracked, pitted, corroded, or potentially allows the leakage of radioactive gases.

Fissile material. Any material fissionable by thermal (slow) neutrons; the two primary fissile isotopes are uranium-235 and plutonium-239.

Fission. The splitting or breaking of a nucleus into at least two other nuclei and the release of a relatively large amount of energy. Two or three neutrons are usually released during this type of transformation.

Fission products. The nuclei produced by fission of heavy elements, and their radioactive decay products.

Fissionable material. Commonly used as a synonym for fissile material, the meaning of this term has been extended to include material that can be fissioned by fast neutrons, such as uranium-238.

Fuel elements. Nuclear reactor fuel including both the fissile and the structural material serves as cladding.

Full-cost recovery fee. A fee that could be charged to foreign research reactor operators that recovers all costs incurred by the United States for management of their spent nuclear fuel.

Gamma ray. Very penetrating electromagnetic radiation of nuclear origin. Except for origin and energy level, identical to x-rays. Electromagnetic radiation frequently accompanying alpha and beta emissions as radioactive materials decay.

Geologic repository. A place to dispose of radioactive waste deep beneath the earth's surface.

Groundshine. The radiation dose received from radioactive material deposited on the ground's surface.

Half-life. The time in which one-half of the atoms of a particular radioactive substance disintegrate to another nuclear form.

Hazardous material. A substance or material in a quantity and form which may pose an unreasonable risk to health and safety or property when transported in commerce.

Hazardous substance. Any substance that when released to the environment in an uncontrolled or unpermitted fashion becomes subject to the reporting and possible response provisions of the Clean Water Act and the Comprehensive Environmental Response, Compensation, and Liability Act.

Hazardous waste. (1) Wastes that are identified or listed in 40 CFR 261.31 and 261.32. Source, special nuclear material, and by-product material as defined by the Atomic Energy Act of 1954, as amended, are specifically excluded from the term hazardous wastes. (2) As defined in RCRA, a solid waste, or combination of wastes, that because of its quantity, concentration, or physical, chemical, or infectious characteristics, may cause or significantly contribute to an increase in mortality or serious, irreversible, or incapacitating reversible illness or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. (3) By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity).

High-efficiency particulate air (HEPA) filter. A filter with an efficiency of at least 99.95 percent used to remove particles from air exhaust streams prior to releasing to the atmosphere.

Highly enriched uranium (HEU). Uranium with more than 20 percent of the uranium-235 isotope, used for making nuclear weapons and also as fuel for some isotope-production, research, naval propulsion, and power reactors.

High-level waste. The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly from reprocessing and any solid waste derived from the liquid that contains a combination of transuranic and fission product nuclides in quantities that require permanent isolation. High-level waste may include the highly radioactive material that the NRC, consistent with existing law, determines by rule requires permanent isolation.

Inflation. A change in the nominal price level of all goods or services, unrelated to the real escalation of a particular good or service.

Isotopes. Different forms of the same chemical element that differ only by the number of neutrons in their nucleus. Most elements have more than one naturally occurring isotope. Many more isotopes have been produced in reactors and scientific laboratories.

Latent cancer fatalities (LCF). Deaths occurring at later years from radiation-induced cancers.

Levelization. Conversion of a stream of values that vary at a uniform rate over time to a constant value over the same period of time.

Life cycle costs. All costs except the cost of personnel occupying the facility incurred from the time that space requirement is defined until the facility passes out of the government's hands.

Low enriched uranium (LEU). Uranium enriched until it consists of up to 20 percent uranium-235. Used as nuclear reactor fuel.

Low-level waste. A catchall term for any radioactive waste that is not spent fuel, high-level, or transuranic waste.

Management (spent nuclear fuel). Emplacing, operating, and administering facilities, transportation systems, and procedures in order to ensure safe and environmentally responsible handling and storage of spent nuclear fuel pending (and in anticipation of a decision on ultimate disposition. Spent nuclear fuel management also includes activities such as stabilization, examination/characterization, processing or chemical separation, and research and development; including activities that may be necessary to prepare spent nuclear fuel for ultimate disposition.

Maximally exposed individual (MEI). A theoretical individual living at the site boundary receiving the maximum exposure. The individual is assumed to be located in a direction downwind from the release point.

Maximally exposed worker. A marine transport worker, port worker, ground transport worker, or onsite radiation worker who could receive the maximum radiation exposure in a given situation.

Maximum contaminant level (MCL). The maximum permissible levels of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under the circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

Metric tons of heavy metal (MTHM). Quantities of unirradiated and spent nuclear fuel and targets are traditionally expressed in terms of metric tons of heavy metal (typically uranium), without the inclusion of other materials, such as cladding, alloy materials, and structural materials. A metric ton is 1,000 kilograms, which is equal to about 2,200 pounds.

National Environmental Policy Act. A Federal law, enacted in 1970, that requires the Federal government to consider the environmental impacts of, and alternatives to, major proposed actions in its decisionmaking processes. Commonly referred to by its acronym, NEPA.

Natural phenomena accidents. Accidents that are initiated by phenomena such as earthquakes, tornadoes, floods, etc.

Nearest public access individual (NPAI). A theoretical individual located at the point of nearest public access to a DOE facility, usually during an accident situation.

Net present value. The value of a series of future income and expense streams brought forward to the present at the discount rate.

Neutron. Uncharged elementary particles with a mass slightly greater than that of the proton, and found in the nucleus of every atom heavier than hydrogen.

Nonproliferation. Efforts to prevent or slow the spread of nuclear weapons and the materials and technologies used to produce them.

Normal operation. All normal conditions and those abnormal conditions that frequency estimation techniques indicate occur with a frequency greater than 0.1 events per year.

Nuclear fuel. Materials that are fissionable and can be used in nuclear reactors.

Plutonium. A manmade fissile element. Pure plutonium is a silvery metal that is heavier than lead. Material rich in the plutonium-239 isotope is preferred for manufacturing nuclear weapons, although any plutonium can be used. Plutonium-239 has a half-life of 24,000 years.

Population dose. See collective dose.

Probable maximum flood. The largest flood for which there is any reasonable expectancy in a specific area. The probable maximum flood is normally several times larger than the largest flood of record.

Processing (of spent nuclear fuel). Applying a chemical or physical process designed to alter the characteristics of the spent nuclear fuel matrix.

Public. Anyone outside the DOE site boundary at the time of an accident or during normal operation.

PUREX. An acronym for Plutonium-Uranium Extraction, the name of the chemical process usually used to reprocess spent nuclear fuel and irradiated targets.

Rad. The special unit of absorbed dose. One rad (0.01 gray) is equal to an absorbed dose of 100 ergs/gram.

Radiation (ionizing). Energy transferred through space or other media in the form of particles or waves. In this document, we refer to ionizing radiation which is capable of breaking up atoms or molecules. The splitting, or decay, of unstable atoms emits ionizing radiation.

Radioactive waste. Waste that is managed for its radioactive content; solid, liquid or gaseous material that contains radionuclides regulated under the AEA of 1954, as amended and of negligible economic value considering costs of recovery.

Radioactivity. The spontaneous emission of radiation from the nucleus of an atom. Radionuclides lose particles and energy through this process of radioactive decay.

Region of influence. Region in which the principal direct and indirect socioeconomic effects of actions are likely to occur and are expected to be of consequence for local jurisdictions.

Regulated substances. A general term used to refer to materials other than radionuclides that may be regulated by other applicable Federal, State, (or possibly local) requirements.

rem. Roentgen Equivalent Man which is a unit of dose equivalent. Dose equivalent in rem is numerically equal to the absorbed dose in rad multiplied by a quality factor, distribution factor and any other necessary modifying factor (1 rem = 0.01 sievert).

Reprocessing (spent nuclear fuel). See chemical separation.

Risk. Quantitative expression of possible loss that considers both the probability that a hazard causes harm and the consequences of that event.

Saltstone. Low-radioactivity fraction of high-level waste formed into a concrete block at the Savannah River Site.

Source material. (1) Uranium, thorium, or any other material that is determined by the Nuclear Regulatory Commission pursuant to the provisions of the Atomic Energy Act of 1954, Section 61, to be source material; or (2) ores containing one or more of the foregoing materials, in such concentration as the Nuclear Regulatory Commission may by regulation determine from time-to-time [Atomic Energy Act 11(z)].

Special nuclear material. (1) Plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the Nuclear Regulatory Commission, pursuant to the provisions of the Atomic Energy Act of 1954, Section 51, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing, but does not include source material.

Spent nuclear fuel. Fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated.

Stabilization (of spent nuclear fuel). Actions taken to further confine or reduce the hazards associated with spent nuclear fuel, as necessary for safe management and environmentally responsible storage for extended periods of time. Activities which may be necessary to stabilize spent nuclear fuel include canning, processing, and passivation.

Storage. The collection and containment of waste or spent nuclear fuel in such a manner as not to constitute disposal of the waste or spent nuclear fuel for the purposes of awaiting treatment or disposal capacity (i.e., not short-term accumulation).

Surface water. All waters that are open to the atmosphere and subject to surface runoff. All waters naturally open to the atmosphere (rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.) and all springs, wells, or other collectors that are directly influenced by surface water.

Target. A tube, rod, or other form containing material that, on being irradiated in a nuclear reactor would produce a designed end product (i.e., uranium-238 produces plutonium-239 and neptunium-237 produces plutonium-238).

Target material. Residual material that is left after a target has been irradiated and dissolved, and the end product has been removed. In this EIS, target material contains enriched uranium and fission products.

Total effective dose equivalent. The sum of the deep dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

Type B packaging. Packaging for radioactive material which meets the standards for Type A packaging and, in addition, meets the standards for the hypothetical accident conditions of transport as prescribed in 49 Code of Federal Regulations Part 173.398(c). This includes spent fuel casks.

Ultimate disposition. The final step in which a material is either processed for some use or disposed of.

Undiscounted dollars. Expressing income and expenditures in the year they occur, not at some common point in time.

Uranium. The basic material for nuclear technology. It is a slightly radioactive naturally occurring heavy metal that is more dense than lead. Uranium is 40 times more common than silver.

Vitrification. The process of immobilizing waste that produces a glass-like solid that permanently captures the radioactive materials.

Vulnerabilities. Conditions or weaknesses that may lead to radiation exposure to the public, unnecessary or increased exposure to the workers, or release of radioactive materials to the environment.

Waste classification. Wastes are classified according to 10 CFR § 61.55 for the purpose of near surface disposal to three classes: A, B, and C. Class C waste represents the waste that must meet the most rigorous requirements on waste form to ensure stability and additional measures at the disposal facility to protect against inadvertent intrusion.

Waste management. The planning, coordination, and direction of those functions related to generation, handling, treatment, storage, transportation, and disposal of waste, as well as associated surveillance and maintenance activities.

Waste minimization. An action that economically avoids or reduces the generation of waste by source reduction or reduces the toxicity of hazardous waste, improving energy usage, or by recycling. This action will be consistent with the general goal of minimizing present and future threats to human health, safety, and the environment.

Wet storage. Storage of spent nuclear fuel in a pool of water, generally for the purposes of both cooling and worker shielding.